A wearable passive force sensor powered by an active interrogator intended for intra-splint use for the detection and recording of bruxism

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Abstract— **A wearable bite force sensing system prototype made up of a passive force sensor and an active interrogator/reader is described. The system is aimed at bite sensing using a wireless link between the passive sensor to be located in the mouth and the external interrogator that can record the evolution of detected force. The interrogator generates a magnetic field that energizes the passive sensor which is also used as the information transmission carrier. The passive force sensor does not need a battery to operate it because it can extract the energy it needs to operate from the carrier field generated by the interrogator. Occlusal force quantification can be used for the detection of bruxing episodes and registration. The small size of the components used (smd) and its further size reduction if they are integrated would allow an implant the size of a tooth.**

Keywords-component; wireless sensor, passive force sensor, near field communication-based sensor.

There have been some experimental studies of bruxism using piezoelectric sensors [2], force sensors [3] or electromyography [4], but these studies have always been carried out in an environmentally controlled experiment because they used wires to transmit the information recorded by the sensors. The use a of Bluetooth-based wireless communication system between a mouth located sensor and an external receiver has been developed for diagnosis and registration of bruxing episodes by the authors in [5]. However some problems related with the size of the intrabucal device, with the short lifetime of the small (intrabucal) battery and with biological tissue absorption, have limited its applicability. The main results of these studies related to bruxism episodes can be summarised in Fig. 1, which represents the distribution of the bruxist population considering the bite force and the aggregated duration of the episodes as the most important factors of bruxism episodes. It is important to point out that everybody

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